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Building & Highway Material Testing Laboratory

NABL - Accredited Laboratory as per ISO / IEC-17025 :2005

T-2377

Job No.: CTCE/BBMP/RM/W.No.09/CSR-09/153c/CEMENT/2016-17 Date: 28.09.2016

TEST REPORT ON CEMENT

* CUSTOMER	:	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
*AGENCY		**Mr. R. Madhusudhan,** Contractor, Bangalore.
*NAME OF THE WORK	:	Improvements and Asphalting to roads at Anjaneya Swamy Layout balance roads in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE		BBMP/EE/BTP/WO/126/2016-17 Dated: 21.09.2016
SAMPLE ID	:	Cement
SAMPLE RECEIVED ON	:	26.09.2016
PERIOD OF TESTING	:	26.09.2016 to 28.09.2016

The results of the tests conducted on the cement sample are as follows:

Sl. No	Descriptions	Test Method as per IS	Test Result	Requirements as per IS: 8112-2013
1	Standard Consistency	IS-4031 (Part -4) 1988(RA-2009)	29.00 %	-
2	a) Initial Setting Time	IS-4031 (Part -5) 1988(RA-2009)	150 Minutes	Not Less than 30 Minutes
	b) Final Setting Time	IS-4031 (Part -5) 1988(RA-2009)	480 Minutes	Not More than 600 Minutes
3	Soundness by Le Chartlier Method	IS-4031 (Part-3) 1988(RA-2009)	1 mm	Not more than 10mm

*Information is furnished by the Customer/Representative.

Note:

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⇒ The results indicated above are based on the tests carried out on the samples received in the laboratory.

⇒ Any Query regarding the report must be reported within 30 days from the date of testing.

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VISHWANATH C.
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T-2377

Job No.: CTCE/BBMP/RM/W.No.09/CSR-09/153c/SAND-Gradation/2016-17 : 28.09.2016

TEST REPORT ON DETERMINATION GRADATION OF FINE AGGREGATES

* Customer : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

* Agency : **Mr. R. Madhusudhan,** Contractor, Bangalore.

* Name of Work : Improvements and Asphalting to roads at Anjaneya Swamy Layout balance roads in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : BBMP/EE/BTP/WO/126/2016-17 Dated: 21.09.2016

Technical Reference : IS : 2386 Part 1 - 1963 RA-2007

Sample ID : Fine Aggregates

Sample Received on : 26.09.2016

Date of Testing : 28.09.2016

Total Wt. of Aggregates in gms **1000**

Is Sieve Size in mm	Cumulative Weight Passing in %	Specific Limits as per IS 383-1970 (RA- 2007)			
		Zone-I	Zone-II	Zone-III	Zone-IV
10	100	100	100	100	100
4.75	93.50	90-100	90-100	90-100	95-100
2.36	75.00	60-95	75-100	85-100	95-100
1.18	54.40	30-70	55-90	75-100	90-100
600 Micron	27.00	15-34	35-59	60-79	80-100
300 Micron	12.50	5-20	8-30	12-40	15-50
150 Micron	6.20	0-10	0-10	0-10	0-15

*Information is furnished by the Customer/Representative.

Remarks : This sample is under Zone-I specific limits.

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Job No.: CTCE/BBMP/RM/W.No.09/WMM/Gradation/2016-17 30.09.2016

GRADATION FOR WMM

Customer : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **Mr. R. Madhusudhan,** Contractor, Bangalore.

Name of Work : Improvements and Asphalting to roads at Anjaneya Swamy Layout balance roads in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : BBMP/EE/BTP/WO/126/2016-17 Dated: 21.09.2016

Date of Testing : 30.09.2016

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): **5000**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	85	85	1.7	98.3	95-100
22.4	1790	1875	37.50	62.50	60-80
11.2	1025	2900	58.00	42.00	40-60
4.75	425	3325	66.50	33.50	25-40
2.36	650	3975	79.50	20.50	15-30
0.600	475	4450	89.00	11.00	8-22
0.075	385	4835	96.70	3.30	0-8

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Job No.: CTCE/BBMP/RM/W.No.09/WMM/Gradation/2016-17 03.10.2016

GRADATION FOR WMM

Customer : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **Mr. R. Madhusudhan,** Contractor, Bangalore.

Name of Work : Improvements and Asphalting to roads at Anjaneya Swamy Layout balance roads in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : BBMP/EE/BTP/WO/126/2016-17 Dated: 21.09.2016

Date of Testing : 03.10.2016

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): **5000**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	65	65	1.3	98.7	95-100
22.4	1750	1815	36.30	63.70	60-80
11.2	955	2770	55.40	44.60	40-60
4.75	365	3135	62.70	37.30	25-40
2.36	745	3880	77.60	22.40	15-30
0.600	520	4400	88.00	12.00	8-22
0.075	475	4875	97.50	2.50	0-8

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Job No.: CTCE/BBMP/RM/W.No.09/WMM/Gradation/2016-17 07.10.2016

GRADATION FOR WMM

Customer : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **Mr. R. Madhusudhan,** Contractor, Bangalore.

Name of Work : Improvements and Asphalting to roads at Anjaneya Swamy Layout balance roads in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : BBMP/EE/BTP/WO/126/2016-17 Dated: 21.09.2016

Date of Testing : 07.10.2016

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): **5000**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	85	85	1.7	98.3	95-100
22.4	1655	1740	34.80	65.20	60-80
11.2	945	2685	53.70	46.30	40-60
4.75	315	3000	60.00	40.00	25-40
2.36	765	3765	75.30	24.70	15-30
0.600	525	4290	85.80	14.20	8-22
0.075	430	4720	94.40	5.60	0-8

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Job No.: CTCE/BBMP/RM/W.No.09/WMM/AIV/2016-17 30.09.2016

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. R. Madhusudhan,** Contractor, Bangalore.
Name of the Work	Improvements and Asphalting to roads at Anjaneya Swamy Layout balance roads in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/126/2016-17 Dated: 21.09.2016
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	30.09.2016

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	385	386	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	82	84	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	303	302	
4	Aggregate Impact value = percent fines	21.30	21.76	
	100* (W_2/W_1)%			21.53

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

Note:

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Job No.: CTCE/BBMP/RM/W.No.09/WMM/S-T/2016-17 30.09.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. R. Madhusudhan,** Contractor, Bangalore.
Name of Work	Improvements and Asphalting to roads at Anjaneya Swamy Layout balance roads in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/126/2016-17 Dated: 21.09.2016
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	30.09.2016

Result : Flakiness Index = **11.96%**

Elongation Index = **13.47%**

Result : Combined Flakiness & Elongation index 25.43%

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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Job No.: CTCE/BBMP/RM/W.No.09/SDBC/AIV/2016-17 17.10.2016

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. R. Madhusudhan,** Contractor, Bangalore.
Name of the Work	Improvements and Asphalting to roads at Anjaneya Swamy Layout balance roads in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/126/2016-17 Dated: 21.09.2016
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	17.10.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	391	389	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	85	87	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	306	302	
4	Aggregate Impact value = percent fines $100^* (W_2/W_1)\%$	21.74	22.37	22.05

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/RM/W.No.09/SDBC/Shape_T/2016-17 : 17.10.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	: **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	: **Mr. R. Madhusudhan,** Contractor, Bangalore.
Name of Work	: Improvements and Asphalting to roads at Anjaneya Swamy Layout balance roads in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	: BBMP/EE/BTP/WO/126/2016-17 Dated: 21.09.2016
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 17.10.2016

Result : Flakiness Index = **12.63%**

Elongation Index = **13.69%**

Result : Combined Flakiness & Elongation index **26.32%**

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/RM/W.No.09/SDBC/Stripping/2016-17 17.10.2016

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. R. Madhusudhan,** Contractor, Bangalore.
Name of the work	Improvements and Asphalting to roads at Anjaneya Swamy Layout balance roads in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/126/2016-17 Dated: 21.09.2016
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	17.10.2016

Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.4	3.30	96.70
2	3.2		
3	3.3		

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/RM/W.No.09/SDBC/Sp_Wa/2016-17 17.10.2016

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. R. Madhusudhan,** Contractor, Bangalore.
Name of the Work	Improvements and Asphalting to roads at Anjaneya Swamy Layout balance roads in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/126/2016-17 Dated: 21.09.2016
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	17.10.2016

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2022	2024	2021	
2	Weight of basket suspended in water	W_2 g	755	2020	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1267	1269	1266	
4	Weight of saturated surface dry aggregate in air	W_3 g	2015	2019	2018	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	748	750	752	
6	Weight of oven dried aggregate	W_4 g	1997	2002	1999	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.670	2.669	2.658	2.666
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.736	2.731	2.727	2.731
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.90%	0.85%	0.95%	0.90%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/RM/W.No.09/SDBC/Bit/2016-17 17.10.2016

BITUMEN CONTENT DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AS per IRC:SP:-1984

CUSTOMER	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**Mr. R. Madhusudhan,** Contractor, Bangalore.
NAME OF THE WORK	Improvements and Asphalting to roads at Anjaneya Swamy Layout balance roads in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	BBMP/EE/BTP/WO/126/2016-17 Dated: 21.09.2016
SAMPLE I/D	Roads at Anjaneya Swamy Layout balance roads in Ward No.09
DATE OF TESTING	17.10.2016

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	475	474
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	25	26.00
7. Bitumen content in %	5.00	5.20
8. Average	**5.10**	

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Job No.: CTCE/BBMP/RM/W.No.09/SDBC/Bit/2016-17 17.10.2016

BITUMEN CONTENT GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS2386 and IRC:SP:11-1984

CUSTOMER	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**Mr. R. Madhusudhan,** Contractor, Bangalore.
NAME OF THE WORK	Improvements and Asphalting to roads at Anjaneya Swamy Layout balance roads in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	BBMP/EE/BTP/WO/126/2016-17 Dated: 21.09.2016
SAMPLE I/D	Roads at Anjaneya Swamy Layout balance roads in Ward No.09
DATE OF TESTING	17.10.2016

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	25.63	5.40	5.40	94.60	90-100
4.75	261.2	54.99	60.39	39.61	35-51
2.36	56.23	11.84	72.22	27.78	24-39
1.18	36.45	7.67	79.90	20.10	15-30
0.3	32.12	6.76	86.66	13.34	9-19
0.075	36.28	7.64	94.30	5.70	3-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	36.23	7.64	7.64	92.36	90-100
4.75	255.4	53.88	61.53	38.47	35-51
2.36	56.42	11.90	73.43	26.57	24-39
1.18	35.23	7.43	80.86	19.14	15-30
0.3	36.58	7.72	88.58	11.42	9-19
0.075	32.12	6.78	95.35	4.65	3-8

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Building & Highway Material Testing Laboratory

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JAS-ANZ BSCIC ISO 9001 REGISTERED

Job No.: CTCE/BBMP/RM/W.No.09/SDBC/Bit/2016-17 18.10.2016

BITUMEN CONTENT DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AS per IRC:SP:-1984

CUSTOMER	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**Mr. R. Madhusudhan,** Contractor, Bangalore.
NAME OF THE WORK	Improvements and Asphalting to roads at Anjaneya Swamy Layout balance roads in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	BBMP/EE/BTP/WO/126/2016-17 Dated: 21.09.2016
SAMPLE I/D	Roads at Anjaneya Swamy Layout balance roads in Ward No.09
DATE OF TESTING	18.10.2016

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	475.2	474
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	24.8	26.00
7. Bitumen content in %	4.96	5.20
8. Average	**5.08**	

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BITUMEN CONTENT GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS2386 and IRC:SP:11-1984

CUSTOMER	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**Mr. R. Madhusudhan,** Contractor, Bangalore.
NAME OF THE WORK	Improvements and Asphalting to roads at Anjaneya Swamy Layout balance roads in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	BBMP/EE/BTP/WO/126/2016-17 Dated: 21.09.2016
SAMPLE I/D	Roads at Anjaneya Swamy Layout balance roads in Ward No.09
DATE OF TESTING	18.10.2016

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	25.24	5.31	5.31	94.69	90-100
4.75	261.3	54.99	60.30	39.70	35-51
2.36	54.28	11.42	71.72	28.28	24-39
1.18	36.23	7.62	79.35	20.65	15-30
0.3	36.47	7.67	87.02	12.98	9-19
0.075	37.12	7.81	94.83	5.17	3-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	36.23	7.64	7.64	92.36	90-100
4.75	256.8	54.18	61.82	38.18	35-51
2.36	54.12	11.42	73.24	26.76	24-39
1.18	35.23	7.43	80.67	19.33	15-30
0.3	32.16	6.78	87.46	12.54	9-19
0.075	31.85	6.72	94.18	5.82	3-8

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